REMARKS/ARGUMENTS

Claims 1-22 are pending. Claims 1-4 were rejected under 35 U.S.C. 103(a) as obvious over U.S. Patent No. 5,770,013 to Chance et al. ("Chance") in view U.S. Patent No. 1,765,560 to Clapp ("Clapp") and further in view of the disclosure provided by JAMES D'A. CLARK, PULP TECHNOLOGY AND TREATMENT FOR PAPER (2nd Edition, Miller Freeman Publications, Inc.)(1985)("Clark"). The Office Action rejected Claims 5-18 under 35 U.S.C. 103(a) as obvious over Chance in view of the combination of Clapp, Clark, U.S. Patent No. 5,227,024 to Gomez ("Gomez"), and U.S. Patent No. 5,505,395 to Qiu et al. ("Qiu"). Finally, the Office Action rejected Claims 19-22 under 35 U.S.C. 103(a) as obvious over Chance in view of the combination of Clapp, Clark, Gomez, Qiu, and U.S. Patent No. 6,033,352 to Howard et al. ("Howard").

Independent Claims 1, 5, 15, and 19 each recite a "layer containing *cellulose fibers* and a sufficient quantity of *wood sawdust* such that the resulting paperboard sheet contains between 1 and 40 percent wood sawdust by weight, wherein at least 95 percent of the sawdust by weight has a particle size greater than 350 micrometers and less then 3175 micrometers[.]" Notably, the above claims do not recite any limitation pertaining to the weight percentage or particle size of the claimed *cellulose fibers* but rather recite such limitations only for the claimed *sawdust.*

The Chance Patent

Chance is directed to a method for manufacturing high-quality paper without requiring the use of a size press. Chance discloses a method of manufacturing a multi-ply paper comprising short wood fibers in an amount of about 20% to about 25 %, by weight, wherein the short wood fibers comprise about 5-70 % sawdust. Chance additionally discloses that an inner ply of the multi-ply sheet comprises at least 1 % sawdust. Column 8, lines 33-38; *see also* Figure 4. Based upon these disclosures, the Office Action suggests that Chance teaches a sawdust concentration for the multi-ply sheet of between 1-17.5 %. As noted in the Office Action, Chance does not disclose the use of sawdust wherein "at least 95 percent of the sawdust by weight has a particle size greater than 350 micrometers and less than 3175 micrometers" as

expressly required by independent Claims 1, 5, 15, and 19.

The Clapp Patent

Clapp is directed to a method for manufacturing paperboard that is coated on one surface by china clay, blanc fixe, or other similar materials for imparting a smooth satiny finish to the paperboard. Clapp discloses that its paperboard includes a bottom layer of a suitable paper stock and a top layer of 5 to 20 parts bleached sulphite pulp, 10 to 20 parts wood flour, 10 to 20 parts cellite, 50 to 70 parts china clay, 10 parts silicate of soda, and 5 parts alum. Page 1, line 88 to Page 2, line 13. Clapp discloses that the wood flour may be substituted for "finely divided sawdust capable of passing through a 40 to 80 mesh sieve", however, Clapp goes on to state that resulting paperboard is "not quite as satisfactory when the finely-divided sawdust is used as when the wood flour is used." Page 2, lines 71-79. The Office Action asserts that use of a 40 to 80 mesh sieve would produce sawdust particles of up to 420 μm. However, as will be apparent to one of ordinary skill in the art, this statement is incomplete.

It is common practice in the chemical arts to use a two number mesh size convention when describing a particular sieve. The first number is typically set off by a negative sign (-) and indicates the size of particles that will pass through the sieve. The second number is typically set off by a positive sign (+) and indicates the size of particles that are retained by the sieve. *See* Aldrich, Catalog/Handbook of Fine Chemicals, T848 (2003-2004) attached as Appendix A. Approximately 90 % of the particles sifted through such conventional sieves lie within the stated range. For example, a -4 to +40 sieve suggests that 90% or more of the sifted material would pass through a 4 mesh sieve (particles smaller than 4.76 mm) and be retained by a 40 mesh sieve (particles larger than 420 μm). *Id.* Clapp discloses a "40 to 80 mesh sieve" and, despite omitting the customary positive (+) and negative (-) signs, appears to suggest that 90 percent of the "finely divided sawdust" would pass through a 40 mesh sieve (420 μm) and be retained by an 80 mesh sieve (177 μm). Although it could be argued that a portion of Clapp's finely divided sawdust may be larger than 350 microns, it cannot be credibly argued that Clapp teaches or suggests a paperboard product having a quantity of sawdust wherein "*at least 95 percent of the sawdust by weight* has a particle size greater than 350 micrometers and less than

3175 micrometers" as expressly required by independent Claims 1, 5, 15, and 19.

The Clark Reference

The Office Action relies on Clark to define the contents of Clapp's sulphite pulp. In particular, based on Clark, the Office Action asserts that "a TAPPI reference sulphite pulp comprises 82.6% of fibers having an average length between 1800 micrometers and 3480 micrometers, thus is not distinguishable from the sawdust of the instant invention." Office Action, pages 2-3. Although only 82.6% of Clark fibers are alleged to be within the recited size limit, the Office Action suggests that the cellulose fibers of the sulphite pulp would combine with the 10 to 20 parts wood flour (or its "unsatisfactory" replacement – sawdust) to create an undisclosed percentage of "sawdust" that is greater than 82.6% and presumably within the claimed range. The Office Action also alleges that "much of the finer fraction [of fibers are] not retained in the final paper, thus further increasing the fraction of particles in the final paper that lie within the claimed range." Office Action, page 3. In addition to the fact that the above assumptions are completely unsupported by the text of Clark or Clapp, the Office Action does not point to any single reference or combination of references that teach or suggest sawdust used in paperboard wherein "at least 95 percent of the *sawdust* by weight has a particle size greater than 350 micrometers and less then 3175 micrometers" as expressly required by independent Claims 1, 5, 15, and 19.

In addition, Applicants respectfully assert that the Office Action's reliance on Clark to cure the deficiencies of Clapp is entirely improper and bears no relevance to the claimed sawdust concentration. It is well known in the paper making industry that sulphite is used to chemically breakdown or otherwise digest cellulose fibers into a pulp that can be used for papermaking. The fibers of sulphite pulp are not considered by persons skilled in the art to be "sawdust." The mere fact that the pulp fibers may have lengths similar to the recited sawdust particle size does not mean that the fibers are equivalent to sawdust, any more then a 1-inch long piece of string is the same as a 1-inch long piece of heavy duty rope.

Independent Claims 1, 5, 15, and 19 each require a quantity of *cellulose fibers* and a

quantity of *wood sawdust*. Similarly, Clapp discloses that its top layer includes *a bleached sulphite pulp* and a quantity of *wood flour* (or finely divided wood sawdust). The Office Action's effort to interpret Clapp's bleached sulphite pulp using Clark bears no relevance to the particle size or relative concentration of Clapp's wood flour (or finely divided sawdust). Instead, the Office Action's use of Clark to interpret Clapp's sulphite pulp is relevant, if at all, only to the "cellulose fibers" recited in independent Claims 1, 5, 15, and 19. As noted, the independent claims have no limitation as to the size or relative concentration of the cellulose fibers. The Office Action's use of Clark attempts to rewrite Applicants' claims to require that the recited cellulose fibers and wood sawdust be combined to form *a total cellulose material content* such that "at least 95 percent of the *total cellulose material content* by weight has a particle size greater than 350 micrometers and less then micrometers." This is clearly improper and bears no resemblance to Claims 1, 5, 15, and 19, which clearly recite that "at least 95 percent of the *sawdust* by weight has a particle size greater than 350 micrometers and less then 3175 micrometers."

To reject the remaining claims, the Office Action relies on disclosure provided within the Gomez and Qiu patents that multi-ply paperboard sheets may comprise layers having differing densities. However, the Office Action neglects to note that Gomez expressly teaches away from the claimed paperboard by disclosing that its low density filler is comprised of a pulverized vegetable filler or wood waste material wherein "at least 95% by weight of the particles...are less than 150 micrometers in size and at least 80 % by weight of the particles are greater than 10 micrometers in size." Abstract, column 4, lines 9-15, and lines 58-66. As such, Applicants respectfully submit that Gomez is not combinable with any reference for purposes of rendering obvious Claims 1, 5, 15, and 19, which require "at least 95 percent of the sawdust by weight has a particle size greater than 350 micrometers and less then 3175 micrometers." While disclosing that paper tubes may include layers of differing densities, the Qiu reference does not teach or suggest that such differing densities are attributable to the use of sawdust within a low-density paperboard layer. Thus, Qiu cannot teach or suggest that "at least 95 percent of the sawdust by weight has a particle size greater than 350 micrometers and less then 3175 micrometers."

Finally, the Office Action relies on Chance, Clapp, Clark, Gomez, Qiu, and Howard's disclosure of spiral winding in order to reject Claims 19-22. Applicants respectfully submit that the Office Action's conclusion that Claims 19-22 are obvious in view of the combination of the above six references is impermissibly based on hindsight. There is no implicit or explicit motivation, outside of Applicants' present disclosure, to combine this vast array of references. However, as discussed in detail above, even if all six of the above references were improperly combined they still would not teach or suggest every element of independent Claims 1, 5, 15, and 19. None of the cited references, taken alone or in combination, teach or suggest a paperboard sheet comprising "at least one layer containing cellulose fibers and a sufficient quantity of wood sawdust such that the resulting paperboard sheet contains between 1 and 40 percent wood sawdust by weight, wherein at least 95 percent of the sawdust by weight has a particle size greater than 350 micrometers and less then 3175 micrometers" as expressly required by independent Claims 1, 5, 15, and 19.

For at least the reasons set forth above, it is respectfully submitted that independent Claims 1, 5, 15, and 19 are patentable over the cited references. Thus, dependent Claims 2-4, 6-14, 16-18, and 20-22 are patentable over these references as well.

It is not believed that extensions of time or fees for net addition of claims are required, beyond those that may otherwise be provided for in documents accompanying this paper. However, in the event that additional extensions of time are necessary to allow consideration of this paper, such extensions are hereby petitioned under 37 CFR § 1.136(a), and any fee required therefor (including fees for net addition of claims) is hereby authorized to be charged to Deposit Account No. 16-0605.

Respectfully submitted,

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Particle Size Conversion

Sieve Designation		Nominal Sieve Opening		
Standard	*Mesh*	*inches*	*mm*	*Microns*
25.4 mm	1 in.	1.00	25.4	25400
22.6 mm	7/8 in.	0.875	22.6	22600
19.0 mm	3/4 in.	0.750	19.0	19000
16.0 mm	5/8 in.	0.625	16.0	16000
13.5 mm	0.530 in.	0.530	13.5	13500
12.7 mm	1/2 in.	0.500	12.7	12700
11.2 mm	7/16 in.	0.438	11.2	11200
9.51 mm	3/8 in.	0.375	9.51	9510
8.00 mm	5/16 in.	0.312	8.00	8000
6.73 mm	0.265 in.	0.265	6.73	6730
6.35 mm	1/4 in.	0.250	6.35	6350
5.66mm	No.3 1/2	0.223	5.66	5660
4.76 mm	No. 4	0.187	4.76	4760
4.00 mm	No. 5	0.157	4.00	4000
3.36 mm	No. 6	0.132	3.36	3360
2.83 mm	No. 7	0.111	2.83	2830
2.38 mm	No. 8	0.0937	2.38	2380
2.00 mm	No. 10	0.0787	2.00	2000
1.68 mm	No. 12	0.0661	1.68	1680
1.41 mm	No. 14	0.0555	1.41	1410
1.19 mm	No. 16	0.0469	1.19	1190
1.00 mm	No. 18	0.0394	1.00	1000
841 µm	No. 20	0.0331	0.841	841
707 µm	No. 25	0.0278	0.707	707
595 µm	No. 30	0.0234	0.595	595
500 µm	No. 35	0.0197	0.500	500
420 µm	No. 40	0.0165	0.420	420
354 µm	No. 45	0.0139	0.354	354
297 µm	No. 50	0.0117	0.297	297
250 µm	No. 60	0.0098	0.250	250
210 µm	No. 70	0.0083	0.210	210
177 µm	No. 80	0.0070	0.177	177
149 µm	No. 100	0.0059	0.149	149
125 µm	No. 120	0.0049	0.125	125
105 µm	No. 140	0.0041	0.105	105
88 µm	No. 170	0.0035	0.088	88
74 µm	No. 200	0.0029	0.074	74
63 µm	No. 230	0.0025	0.063	63
53 µm	No. 270	0.0021	0.053	53
44 µm	No. 325	0.0017	0.044	44
37 µm	No. 400	0.0015	0.037	37

Larger sieve openings (1 in. to 1/4 in.) have been designated by a sieve "mesh" size that corresponds to the size of the opening in inches. Smaller sieve "mesh" sizes of 3 1/2 to 400 are

designated by the number of openings per linear inch in the sieve.

The following convention is used to characterize particle size by mesh designation:

- a "+" before the sieve mesh indicates the particles are retained by the sieve;
- a "-" before the sieve mesh indicates the particles pass through the sieve;
- typically 90% or more of the particles will lie within the indicated range.

For example, if the particle size of a material is described as -4 +40 mesh, then 90% or more of the material will pass through a 4-mesh sieve (particles smaller than 4.76 mm) **and** be retained by a 40-mesh sieve (particles larger than 0.420 mm). If a material is described as -40 mesh, then 90% or more of the material will pass through a 40-mesh sieve (particles smaller than 0.420 mm).

This information is also provided on page T848 of the Aldrich 2003-2004 Catalog/Handbook of Fine Chemicals.

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